

QUICK RELEASE FOR LADDER LEVELERS

BACKGROUND

[001] For many types of ladders, including extension, combination, and sectional ladders, it is useful to have a leveler at the bottom of one leg or both legs. The leveler effectively adjusts the length of the bottom of the leg so that the ladder will go straight up from uneven ground or from different treads in a staircase. For safety, levelers are preferably securely bolted to the rails of the ladder or a static portion of the leveler may be integral with the leg of the ladder.

[002] For ladders that are often used without a leveler, it is undesirable to have the extra weight of the levelers always present. Although levelers have been designed that quickly attach to rungs of a ladder or slip over the bottoms of the rails to achieve a quick attachment and release feature, these attachments are not sufficiently secure and include protrusions that catch on objects, damaging the object or the protrusion or creating a hazard.

SUMMARY OF THE INVENTION

[003] The invention is a way of attaching a leveler to a ladder so that it can be quickly and securely mounted and released by hand without using tools. The outside of the bottom of each rail of a ladder is adapted with a leveler attachment structure that allows quick attachment and release of a leveler having a mating structure that mates with the attachment structure. The attachment structure may be a leveler attachment base that is attached to standard ladder rails, such as by bolts or rivets, or the attachment structure may be built into the ladder rails when the rails are fabricated.

[004] In preferred embodiments, to mount the leveler, it is placed in engagement with the attachment structure where it is restrained against movement in all but two opposing directions and then it is slid in one of those two directions until it is caught by a movable catchment. Once it is caught, it is restrained against movement in 5 directions at

right angles to each other by the attachment structure and it is restrained against movement in the sixth direction by the movable catchment until the catchment is released, releasing the leveler. This relationship of relative movement may be accomplished by a knob on one of the mating pieces and a slot on the other that receives the knob. The slot and the knob may be on either of the two pieces. Likewise, the movable catchment may be on either of the two pieces. The original directions in which movement is allowed may be up and down, in and out, or left and right.

[005] In one aspect, the invention is a method of attaching a leveler to a ladder by procuring a ladder having at a lower end of each rail, on an outer surface of the rail, a leveler attachment structure that is adapted for hand releasably engaging a leveler and then releasably attaching to the structure a hand releasable leveler that matingly engages the structure. A hand movable catch retains the leveler in engagement with the attachment base. For added security, a locking pin may be inserted to prevent disengagement in the event the hand movable catch is accidentally released or fails.

[006] In another aspect, the invention is a kit consisting of a ladder leveler plus an attachment base for connection between the leveler and the ladder. The leveler has a mating structure that engagingly and hand releasably mates with the base. The base has a ladder rail mating surface for attachment to a ladder rail and, opposite the mating surface, a leveler attachment structure that engagingly and hand releasably mates with the leveler.

[007] In a third aspect, the invention is a hand releasable ladder leveler by itself. The leveler comprises a leveler body with a side for coupling with a ladder and, on that side, a hand releasable mating structure that engagingly mates with a leveler attachment structure. A hand releasable catchment releasably retains the leveler to the attachment structure. The hand releasable catchment may be a spring latch mounted on the leveler or it may be a catch surface that catches a spring latch mounted on the base. In one embodiment, the mating structures comprise knobs that matingly engage with slots in the base.

[008] In a fourth aspect, the invention is a leveler attachment base for mounting on a ladder. The base has a flat surface on one side for mating with a rail of a ladder, the surface being at least one inch wide by eight inches high, and having at least two ladder rail attachment points. The attachment points may be holes for attachment with rivets or

bolts or they may be protrusions that engage the ladder rail and are secured with pins or rivets. Opposite the ladder rail mating surface there is at least one leveler attachment structure that engagingly mates with a ladder leveler. The attachment structure may be a slot that engagingly receives a knob on the leveler. The base includes a hand releasable catchment for releasably retaining a ladder leveler, which may be a spring latch or a catch surface that catches a spring latch.

[009] In a fifth aspect, the invention is a ladder that is supplied in the market place with leveler attachment structures all ready included on the outer surface of the lower end of each rail. Because the attachment structures are all ready included with the ladder, it is ready for attachment of a hand mountable and releasable leveler according to this invention. In this aspect, the invention comprises a ladder with two parallel rails connected by rungs and, on a lower end of an outer surface of each rail, at least one leveler attachment structure for engagingly mating with a ladder leveler. Associated with the attachment structure is a hand releasable catchment for releasably retaining a ladder leveler, which catchment may be a spring latch or a catch surface that catches a spring latch. The attachment structure may be a slot that receives a knob on a leveler. Conversely, the attachment structure may be a knob that engages a slot on a leveler:

BRIEF DESCRIPTION OF THE DRAWINGS

[010] The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. Aspects of the invention may best be understood by making reference to the following description taken in conjunction with the accompanying drawings wherein:

[011] Figure 1 shows one embodiment of a leveler and a leveler attachment base attached to a ladder rail.

[012] Figure 2 is an exploded diagonal view of the leveler attachment base.

[013] Figure 3 shows a section view of a knob ready for insertion into a slot.

[014] Figure 4 shows the knob in the latched position.

DETAILED DESCRIPTION

[015] In the following detailed description of exemplary embodiments of the invention, reference is made to the accompanying drawings. The detailed description and the drawings illustrate specific exemplary embodiments by which the invention may be practiced. Other embodiments may be utilized, and other changes may be made, without departing from the spirit or scope of the present invention. The following detailed description is therefore not to be taken in a limiting sense, and the scope of the present invention is defined by the stated claims.

[016] Figure 1 shows one embodiment of the leveler 10 and the leveler attachment base 11 attached to a ladder rail 12 with an exemplary rung 13. The attachment base 11, bolts 14 that secure the attachment base to the ladder rail, and knobs 15 that protrude from the leveler 10 and mate with the attachment base 11 are all shown in cross-section. Also shown is a spring latch 16 that catches on a catch surface 17 on one of the knobs 15. The latch 16 is held in a position engaging the catch surface 17 by a spring 18 which is held in place by two rivets 19. The cross-sectional view also shows the shaft of a locking pin 20 which may be inserted to insure safety. The locking pin may be a ring pin.

[017] Figure 2 is an exploded diagonal view of the leveler attachment base. It shows the parts identified in the previous paragraph and, in addition shows a hinge pin 22 that passes through the base 11 and the spring latch 16 as well as through two washers 23 it is retained by a nut on each end 24. Figure 2 also more clearly shows the nuts 21 that secure the attachment base 11 to the ladder rail 12 using the attachment bolts 14. Figure 2 further shows the attachment structure 25 that engages a mating structure 15 from the leveler. In the embodiment shown in figure 2, each attachment structure is a keyhole slot, each mating structure is a knob, and the design includes three pairs of keyhole slots and knobs. Any of many alternative structures for hand releasably engagingly mating the leveler to the attachment base could be used. For example, slots that those shown in figure 2 could be on the leveler and knobs like those shown in figure 2 could be on the attachment base. In addition, the structure of the attachment base can be integrated with the rail of a ladder.

[018] Figure 2 shows a hole 26 for receiving a locking pin, not shown.

[019] The dimensions of the attachment base 11 should be at least one inch by eight inches to insure adequate rigidity in its connection to the ladder rail and to the leveler. In one embodiment, the dimensions of the attachment base are one and one-half inch by 12 inches. The attachment base need be only as thick as necessary to perform all of its functions. In one embodiment made of 6063-T52 aluminum rectangular tubing with one-eighth inch wall thickness, the base is three-quarters inch thick in the smallest dimension of the base.

[020] To clarify the operation of the spring latch 16, figure 3 shows a section view of a knob 15 ready for insertion into a slot 25. The spring 18 hold the latch against the slot 25.

[021] Figure 4 shows the knob 15 in the latched position. The spring 18 holds the latch 16 into a position that catches the catch surface 17 of the knob 15.

[022] Although the present invention has been described in considerable detail with reference to certain embodiments, other embodiments are possible. Therefore, the spirit or scope of the appended claims should not be limited to the description of the embodiments contained herein. It is intended that the invention resides in the claims hereinafter appended.